N.A.C.A. BULLETIN

In Two Sections

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EDITORIAL DEPARTMENT NOTE

Operation of a budgetary control plan involves more than a technical knowledge of how a budget is constructed. It implies an understanding of the problems of production, of the size of inventories in relation to volume of sales, of plant capacities, as well as of the behavior of costs. The first article in this issue represents a case study of a budgetary control plan which pays special attention to these problems, among them the problem of leveling production through regulation of inventories and its repercussions on labor relations.

ROBERT WALKER, author of the article on synchronized budgeting, has been with the Monroe Calculating Machine Co. for 19 years. It is, as he says, his first and only job. After a year at the University of Pittsburgh, Mr. Walker entered the Accounting Department of the Monroe Co. He became Assistant Supervisor of the Cost Department before his promotion to Supervisor of Budgets, the position he now holds.

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More and more cost accountants are becoming aware of the necessity for presenting different kinds of costs to management to satisfy various needs. That these needs are real is attested by the response given to Research Bulletin No. 7 (May 15, 1946, Section II) which set forth the bases upon which different types of costs rest. In the second article in the current issue, the author devotes himself mainly to costs for managerial decisions.

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Labor relations continue to occupy the front and editorial pages of our newspapers. Along with employee demands for increased rates of pay to offset increased costs of living we have complaints of reduced employee efficiency, resulting in the higher costs and prices which go to make up the cost of living. How an incentive wage payment plan has led to increased efficiency and lower costs on the one hand and increased income to the worker on the other is described in our third article.

A. O. HARDING, author of "A Simple Incentive Method That Pays," was born in a log cabin in Shelby County, Ind., in 1885. He has had a varied industrial career and is now Chief Accountant and Secretary of New Castle Products, Inc. He is a charter member of the Indianapolis Chapter of the N. A. C. A. and has served as its Director of Publications and Vice President.

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SYNCHRONIZED BUDGETING IN THE BUSINESS MACHINE INDUSTRY

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THE purpose of this paper is to outline certain phases of budgeting and their specific applications to an industrial concern engaged in manufacturing and selling business machines on a large scale and distributing them nation-wide through its own sales outlets. The products are divided into three classes: calculating, adding-listing, and bookkeeping machines. Many models in each category are produced and production is for stock rather than for customers' orders. The company operates a standard cost system employing the standard-hour plan; that is, the finished product is expressed in the number of standard hours required to produce it. The plan, as presented, is not a description of a complete budgetary control system, but is concerned only with production, inventories, capacities, and manufacturing costs.

The Sales Budget

In modern business all functional activities are closely related. The activities of one department are to a great extent dependent upon the operations of all the others. Hence a unified plan of operation, such as is provided by a budget, is a necessity. In such a plan, the sales estimate is of primary importance. No program can be intelligently made for either the production or service departments without previously preparing a forecast of the volume of sales to be handled. Of course, it is impossible to measure sales probabilities with absolute accuracy, but forecasts can be set sufficiently close to those probabilities to furnish a sound plan of operation.

The principal problem in forecasting sales is the difficulty of predetermining future business activity in general and the effect of that activity on the sales of the concern being budgeted. A careful study through past years will show the relationship of a single business enterprise to that of general business, and the same study will reveal what may reasonably be expected in sales volume resulting from the natural expansion or growth of the concern. It must be realized that the further a problem is broken down and analyzed, the smaller becomes the element of guesswork. Operat-

ing under this philosophy, sales forecasting can be surprisingly successful.

The sales budget period of our company covers a calendar year. However, since the viewpoint of a budget is forward-looking, it must be kept so. An estimate made in January for the ensuing twelve months is truly looking forward, but if we let it rest there the projection into the future becomes shorter and shorter with each passing month. Eventually December arrives and we find we are not looking ahead at all. To overcome this condition, the normal sales of our organization are constantly being estimated and projected several years into the future. In order to determine the normal sales for each future year, studies were made to establish growth trends for each of the three products.

Establishing Yearly Growth

Simple line charts were prepared showing the monthly sales for as many past years as possible for each product. After plotting the sales curves, an analysis was made to determine the causes of all large fluctuations. Most of these variations were found to result from disturbing factors, such as changes in sales policies, sales contests, special advertising campaigns, etc. Adjustments were then made to eliminate as far as possible their effects, and the adjusted sales replotted in the form of a scatter diagram. A consistent growth trend was then established by drawing a straight line through these points in a manner that placed as much area above the trend line as below. Thus a yearly growth, expressed in terms of sales dollars, was established by means of this trend line. An accumulation of these yearly trend figures became the normal sales, and by simply adding another year's growth to the accumulation for each year of projection it was possible to estimate normal sales several years into the future. We can now adjust these normals upward or downward to expected actual sales depending on estimates of general economic conditions for those future years. There are many other ways which could have been used to establish growth trends, but the majority of them involve the use of higher mathematics. The line chart method is a very simple one and, in most cases, accurate enough.

Seasonal Variation

Because our business is seasonal, the following very simple method was used to establish a seasonal variation index.

1. Dollar sales by months were tabulated for as many past years as the figures were available.
2. The total of all sales in the series was divided by the number of months in the series to determine a monthly sales average.
3. The sales of all Januarys, Februarys, etc., were added and each total divided by the number of years in the series to arrive at an average sale for each month.
4. The individual monthly averages determined by step number 3 were divided by the over-all monthly average established in step number 2.

The above formula results in expressing the average January, February, etc. sales as a percentage of the average over-all monthly sales. With a monthly seasonal variation index thus established, it is a simple matter to spread the yearly sales forecast over the twelve months by the following formula:

$$\text{Monthly sales} = \frac{\text{Yearly sales forecast}}{12} \times \text{Individual monthly index.}$$

In order to keep the sales budget continually projected into the future, the forecast is reviewed at the end of each quarter. Revisions are made if necessary. As each quarter ends it is dropped from the beginning of the series and another quarter is added to the end of the series. By this procedure, the short-range sales forecast is projected into the future for a minimum of nine months and a maximum of twelve months.

Responsibility for Sales Forecast

In our company the sales executive has the responsibility of preparing the forecast of sales income for the coming budget period. He is requested to submit his estimate in terms of dollars and the quantity of each model in each of the three product lines. While the sales executive is engaged in making his forecast, it is the duty of the budget department to serve as economists and furnish all the information necessary for him to make his estimate intelligently. Such information includes predictions of future general business conditions made by the nation's leading economists, what effect those conditions have on our own business, additions or changes in the product lines, growth trend statistics, pricing pol-

icies, past sales, plant capacity, inventories, etc. All these factors are vitally important in sensible budgeting and tend to keep within bounds the natural optimistic tendency of a salesman.

When completed, the sales executive submits his forecast in conference with a budget committee consisting of the treasurer, the secretary, and the controller. After approval by the budget committee the sales estimate is sent to the budget department where it is translated into production hours and man hours. The budget department also spreads the yearly sales estimate over the twelve months based on the seasonal variation index mentioned above.

Productive Capacity

Before a manufacturing company attempts to set a production budget, either its normal or maximum capacity should be definitely known. In most enterprises these are usually determined by the so-called "bottleneck" operations.

Our company has practically an unlimited capacity to produce the component parts for our products and at worst its own facilities can always be supplemented by subcontracting piece parts work. The factor that actually determines our capacities is the number of skilled assemblers and inspectors we have available. The majority of these employees require several years of intensive training. The company's normal capacity is, therefore, based on the number of skilled assemblers and inspectors we have available at forty hours per week. Maximum capacity is determined by the number of hours a week beyond forty those skilled operators can be worked. Additional workers of this type are also being constantly trained in an effort to increase capacity.

Since the standard-hour cost system is used, productive abilities can be expressed in either the number of standard hours available or in the number of standard units that can be produced with those available hours. Over 200 different models are produced in the three product lines. These models range from simple hand machines to complicated semiautomatic and fully automatic units. They vary in size and weight from small portable machines weighing seven pounds to large units weighing eighty or ninety pounds. Under such conditions, a standard unit of measurement is very essential in expressing productive capacity and in comparing production, sales, and inventories.

Standard Unit

To create such a measuring stick, a basic model requiring fifty standard hours to produce was selected as the standard unit. All other models in the line are expressed in terms of this standard unit. For instance, Model "A" is equivalent to 1.5 standard units representing seventy-five standard hours, while Model "B" may represent .8 standard units or forty standard hours.

For purposes of illustration, let us assume that a tentative production schedule by models has been received from management. Knowing the capacity of the plant in terms of standard units, the budget department converts the proposed production schedule to the standard unit equivalent. By doing so, it is possible within fifteen minutes to show management the effect the proposed schedule will have on the organization with respect to the percentage of capacity it will consume. Adjustments can then be made, if necessary, by altering the number or mix of models to arrive at the most efficient schedule, or it may be possible to make adjustments changing the plant capacity.

Direct Labor Budget

Another very important estimate which is directly related to the production budget is the forecast of labor requirements. The chief purposes of a labor budget are:

1. To enable the personnel department to provide workers when and where they are needed.
2. To minimize labor turnover and the losses it causes in time, money, and efficiency.
3. To facilitate the estimating of cash requirements for payrolls.

For many years we have maintained statistical data showing the standard direct labor hours required in each production, inspection, and assembly department to manufacture every model in the various lines. The sources of this information are the make-up records of each model and the operational cost cards. With such information it is possible, within a few hours' time, to determine the number of direct labor hours needed in each department to produce the entire production schedule for the budget period. By adjusting these figures to account for operators' efficiency, absenteeism, scrap, etc., we can make an estimate of the number of hours required in each department to produce the schedule. These depart-

mental man hours, when divided by the number of hours worked per week, result in the number of direct operators required to meet the production schedule. The departmental labor requirements are shown for each month with adjustments made to reflect the time lag in the manufacturing cycle. In other words, the monthly production budgets are expressed in finished units coming off the assembly lines. Naturally, the piece parts going into these finished units are made months before. Therefore, the labor requirements in the starting and intermediate departments must be based on this time lag.

Indirect Labor Budget

Once the direct labor requirements by departments are established, it is a simple task to arrive at the estimate of the indirect help needed, such as setup men, oilers, miscellaneous laborers, etc. Past experience and knowledge of the volume of work to be produced give a fairly accurate idea of the requirements along these lines in relation to the direct operators.

By projecting the monthly labor requirements one year into the future, sufficient time is given the production manager to obtain the quantity and quality of workers he desires. He can place his requisitions for new help with the personnel department far enough in advance to allow it to screen the available market.

The manpower budget is also supplemented with weekly reports which show the production manager his results as he goes along. These reports give him, by departments, the number of good hours he produced compared to the number of hours he must produce to meet his scheduled commitments. Should his output of hours fall below the schedule in any department, he receives an analysis of the reasons. He knows immediately what steps he must take should the reason be a drop in operator efficiency, an abundance of short-run jobs, lack of material, exceptionally high scrap or repairs, an unfavorable balance of "green" help, or an increase in absenteeism. The manpower budget and associated reports have become so reliable and accurate that they are perhaps the principal tools of the production manager and the sole guide in employing new help.

Inventories and Production

It is generally accepted that the more times inventories are turned over at a profit, the greater becomes the return on the in-

vestment. However, obtaining a high turnover and a desirable financial return does not necessarily assure the most profitable operation. By concentrating on a higher turnover and on the investment, other important factors may be overlooked.

In the office machine business, sales volumes fluctuate much more violently than general business in the country. Thus, a stubborn adherence to a constant high turnover policy would result in sharp reductions in inventories during a decline in sales volume and frantic attempts to increase them when sales suddenly turned upward. Manufacturing activity would be a series of sharp peaks and deep valleys, resulting in high labor turnover, inefficiency, and serious training problems. To control these undesirable factors, a policy of considering inventory turnover as a variable rather than a constant was adopted.

Studies were made to determine the amount of inventory that should be carried and the turnover rate that should be expected at different levels of sales activity. We also recognized that in following this principle there is a constant "float" in inventory regardless of the level of sales activity. Naturally only the variable portion of inventory is increased or decreased as a result of changes in sales volume. The amount of "float" that could be safely carried in inventory was determined by studies of past experience plus the best judgment of the executives responsible for our production and sales. The "float" carried in work in process inventory consists mainly of those parts which must be processed in economical lot sizes. These parts either require a considerable amount of setup or are used only in special models with low sales volumes. For economical reasons one or two years' supply of such parts is produced on one production order. The "float" in the finished goods inventory consists of those models maintained to replenish stocks and for trial, demonstration, and loan purposes.

Inventory Turnover

The results of the studies made to determine proper inventory balances and desirable turnover rates are presented graphically on Exhibits 1 and 2. These exhibits depict the results of the studies of finished goods inventory only, but the same principle applies to the work in process and raw material inventories. Exhibit 1 shows the desired rate of turnover for various levels of sales volume. By studying the sales of product A over a long period of time, 200,000 standard units were estimated to be the normal sales of this prod-

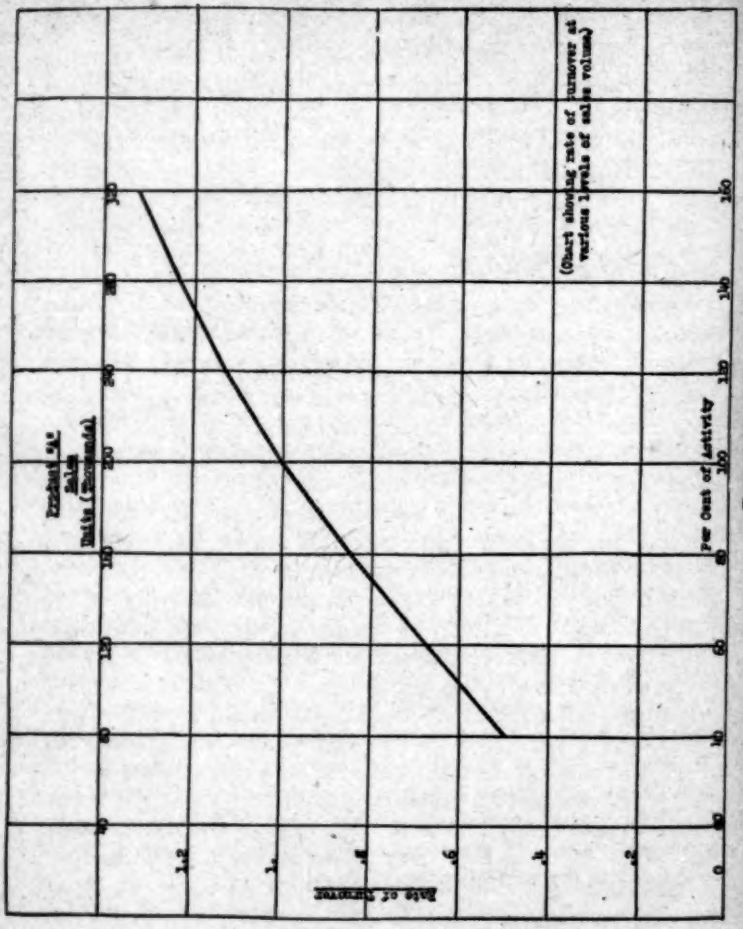


EXHIBIT 1

uct. It was decided that one turnover a year is the best that can be obtained at this volume and that the turnover ratio decreases as sales drop below normal. However, as sales activity passes normal, the turnover progressively increases. For instance, the chart shows that with a sales activity of 140 per cent a turnover of 1.23 times per year should result.

With Exhibit 2 it is possible to budget the investment in inventory at various levels of sales volume. The horizontal axis ex-

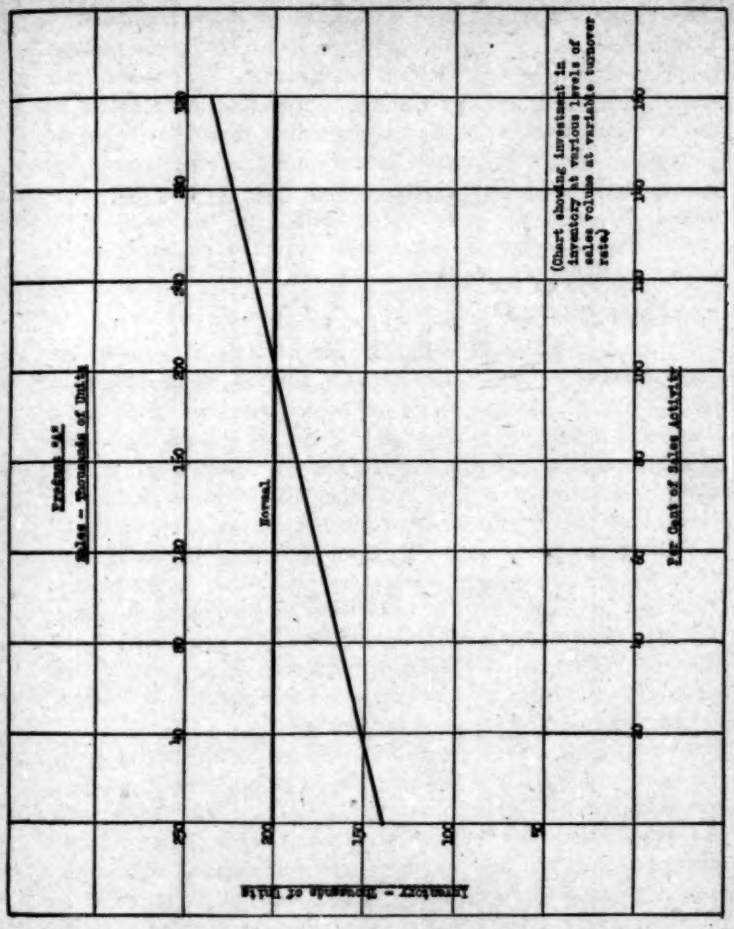

(Chart showing investment in inventory at various levels of sales volume at variable turnover rate)
Normal
Per Cent of Sales Activity
Expressed as Sales — Thousands of Units

EXHIBIT 2

presses the sales volume in thousands of standard units and in percentage of activity. The vertical axis expresses the dollar value of inventory and the rate of turnover expected. It will be noted that the fixed portion of inventory, or the "float", represents 140,000 standard units. This remains constant regardless of sales volume.

At normal, or 100 per cent of sales activity, sales volume represents 200,000 units. Since one turnover a year is desired at this volume, the average inventory, including the "float", should not

exceed 200,000 standard units, based upon figures in Exhibit 1.

With Exhibit 2 it is a simple matter to budget inventories and production once the sales estimate has been set. For example, reference to Exhibit 2 shows that the average inventory should be 225,000 units if sales for the coming budget period are to be 140 per cent of normal or 280,000 standard units. At this volume Exhibit 1 shows a turnover of roughly 1.23 times per year can be expected. Knowing the inventory on hand at the beginning of the period and the average inventory to be carried, it is a simple matter to prepare the production budget.

Leveling Production

By employing this principle of variable rates of turnover for various levels of sales volume, production can be leveled more readily than by adhering to a constant turnover rate. This fact is illustrated in Exhibit 3. The latter shows the leveling of production when the variable turnover rate and a constant "float" are employed. A study of Exhibit 3 reveals that over a period of ten years, sales have fluctuated from a low of 160,000 units in 1934 to a high of 240,000 in 1941. This is a difference of 80,000 units. However, by budgeting inventory and production on the basis of Exhibit 2, production varies from a low of 164,000 units in 1934 to a high of 228,000 units in 1941. This is a production fluctuation of only 64,000 units compared to a sales fluctuation of 80,000 units. It can readily be seen that when this principle is followed, production is leveled to a considerable degree.

In employing this principle of leveling production and inventories it is essential that the sales budget be projected at least two years in advance. By referring to Exhibit 3, it will be noted that the sales volume for the year 1934 was 160,000 units or 80 per cent of normal. At this volume of activity Exhibit 2 indicates that the inventory balance should be 190,000 units. This figure, therefore, represents the opening 1934 inventory on Exhibit 3. At the beginning of 1934 it is also necessary to have an estimated sales volume for the year 1935 which, in this case, is 180,000 units or an activity of 90 per cent. Exhibit 2 shows that at a sales volume of 180,000 units an inventory of 194,000 units should be carried. To attain this position, 1934 production should be planned so that the closing 1934 balance will be as near to 194,000 units as possible. At the beginning of 1935 the estimated sales volume for the year 1936 amounts to 200,000 units, or 100 per cent of normal. At this

VARIABLE VS. CONSTANT INVENTORY TURNOVER

	Sales activity	Sales	Product "A" Variable turnover			Constant turnover		
			Opening inventory	Closing inventory	Production	Opening inventory	Closing inventory	Production
1934	80%	$160,000	$190,000	$194,000	$164,000	$160,000	$160,000	$160,000
1935	90	180,000	194,000	200,000	186,000	160,000	200,000	220,000
1936	100	200,000	200,000	206,000	206,000	200,000	200,000	200,000
1937	110	220,000	206,000	191,000	205,000	200,000	240,000	260,000
1938	85	170,000	191,000	197,000	176,000	240,000	100,000	30,000
1939	95	190,000	197,000	206,000	199,000	100,000	280,000	370,000
1940	110	220,000	206,000	212,000	226,000	280,000	160,000	100,000
1941	120	240,000	212,000	200,000	228,000	160,000	320,000	400,000
1942	100	200,000	200,000	194,000	194,000	320,000	80,000	.....
1943	90	180,000	.....	.....	.....	80,000	280,000	380,000

EXHIBIT 3

volume the inventory position should be 200,000 since one inventory turnover is expected at this activity. Therefore, the 1935 production schedule is planned for 186,000 units in order to end the year with the desired balance of 200,000.

Maintaining Constant Turnover

The last three columns in Exhibit 3 are intended to illustrate what could have conceivably happened had a policy of maintaining one turnover per year been followed. In this picture the same time period and the identical sales figures have been used. The same fluctuation of 80,000 units still exists in the sales totals but the yearly production figures range from a high of 400,000 units to a low of absolutely no production.

If this wide range in production had been experienced over the period of ten years, employment would have fluctuated just as violently. We would have had to add manpower gradually through the years 1934 to 1937, but toward the end of 1937 we would begin making drastic layoffs. This would have continued until our force had been reduced by approximately 85 per cent. During 1939 employment would have been more than ten times that of 1938, and in 1942 not a single production worker would have been necessary. In addition to a fantastic labor turnover, the morale of our employees would have suffered. Such conditions would result in our hiring inexperienced workers, spending thousands of dollars in training programs, only to discharge them a short time later. The productive ability of the organization would necessarily be very inefficient and our merit rating position in reference to unemployment insurance would not be enviable. This may be an extreme example but it does serve to demonstrate what could happen to our inventory and production had we attempted to make turnover rate a constant in our control of these two important items.

Direct Manufacturing Department Budgets

In our organization we have adopted a flexible budget covering the estimates of direct operating expenses of the production departments. As distinguished from the static budget, the flexible variety facilitates the forecasting of the results of business operations at any level of productive activity. It also makes it possible to measure performance from the efficiency standpoint since, through the flexible budget, volume variances can be distinguished from efficiency variances.

Our problems would soon disappear if we could simply add ten per cent to manufacturing expense budgets to cover ten per cent increase in productive activity. But all expenses do not vary in direct proportion to volume and some items remain fixed regardless of volume changes. Hence, a successful flexible budget depends on a study of the characteristics of each expense. In making such a study, it is invariably found that all expenses can be grouped under three major classifications:

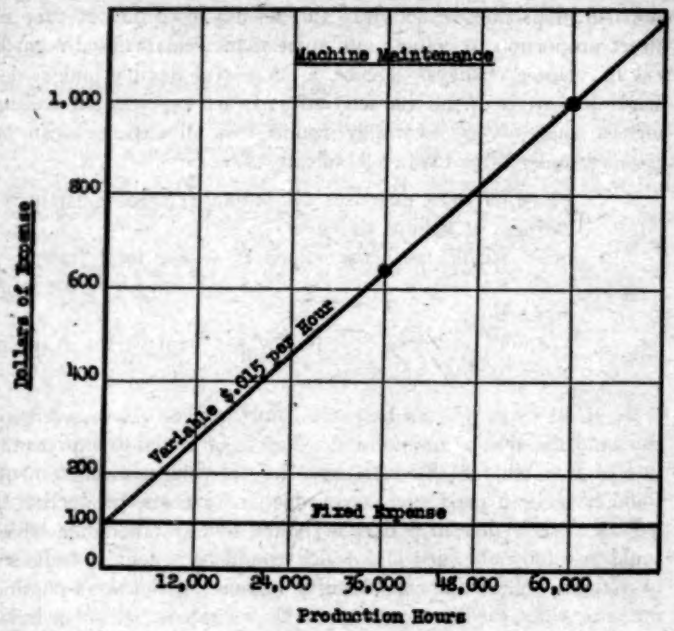
1. Fixed, or those expenses whose total remains constant regardless of volume changes.
2. Semivariable, or those expenses whose total fluctuates with increases or decreases in volume, but not in the same proportion.
3. Variable, or those expenses whose total varies in direct proportion to changes in production volume.

After all expenses had been classified between fixed, semivariable, and variable, a common index had to be found to express the rate of variability of the last two. Several volume measurements could have been used such as production in units, production in dollars, direct labor in dollars or hours, or any other data which could be easily obtained and which would be a definite indicator of volume. When due consideration had been given to all possible measurements, the direct production hour was selected as our index of volume or activity. Through the use of this index as a measure for all variable and semivariable departmental expenses, it is easy to determine what these expenses should amount to for any department or the entire plant at any degree of activity.

Rate of Variability

For purposes of illustrating the flexible budget principle, Exhibits 4, 5, and 6 have been prepared. All figures shown concern the operations of a single manufacturing department designated as Department A. Exhibit 4 is designed to describe the method of determining the fixed and variable elements of a semivariable expense, such as machine maintenance. To establish the fixed and variable portions of machine maintenance cost for Department A, the actual expenses incurred in two different periods are listed on Exhibit 4. These two periods were selected because they represent conditions at two different levels of productive activity. Before using these figures, each period was analyzed and all items not con-

To Determine Fixed and Variable Elements of Expense



Machine Maintenance

Activity	Production Hours	Expense
High	60,000	$1,000.
Low	36,000	640.
Difference	24,000	$ 360.
Increase Over Low Activity	66⅔	56%

Variable Rate = $360. ÷ 24,000 hours = $.015 per Hour

Fixed Element = $1,000. - (60,000 hours x .015)

= $1,000. - 900. = $100.

Exhibit 4

sidered normal expenditures were eliminated. For example, in Department A there may have been, in one of the periods, an unusually high-cost maintenance job on a machine. Such an expense is eliminated from the calculations. In constructing a successful budget, a great deal of this type of analysis must be made. Care must be taken so that allowances are not distorted by the inclusion of abnormal or nonrecurring expenses, which should be given special treatment in sound budgeting.

On the bottom of Exhibit 4 are listed the actual machine maintenance costs for Department A for periods of high and low activity. There is a net difference of 24,000 production hours between the high and low points, corresponding to a difference of $360 in maintenance expenses. The variable rate is then determined by dividing the difference in expense for the two periods, or $360, by the difference in production hours. The result of this computation, or the variable cost per hour, is $.015.

The fixed portion of machine maintenance cost is then determined as $1,000, which represents the total expense at high activity, shown in Exhibit 4.

Allowed Expense

Once the variable and fixed portions of machine maintenance cost have been established, it is comparitively simple to determine what the expense should be at any degree of productive activity. This projection can be done by means of a chart such as that shown on the top of Exhibit 4. By using this graph it is possible to forecast machine maintenance cost for Department A at any volume of production. Exhibit 5 is intended to show a summary of several expenses incurred in Department A. Under the first three columns on the left are figures representing the production hours at a low and a high period of activity, while directly below are listed the costs at each level of activity for four expenses of Department A. On the right side of the illustration, provision has been made for forecasting these expenses for the coming budget period. Columns are also provided to show the type of expense, variable rates per hour, fixed charges, and the budgeted activity expressed in production hours. For simplicity it is assumed that Department A is expected to operate at normal capacity during the budget period. Normal activity is 48,000 hours.

Assuming these four expenses to be all the costs of operating Department A, we find a total variable hourly rate of $.06 and an

FLEXIBLE MANUFACTURING EXPENSE BUDGET

Experience—2 Periods				*Budget—Next Period*					
	Low activity	High activity	Difference	Type of expense	Variable rate per hour	Hours	Fixed expense	Variable expense	Total expense
Production hours	36,000	60,000	24,000			48,000			
Expense									
Supervision	$5,000	$5,000	$ 0	Fixed	$ —		$5,000	$ —	$5,000
Machine maintenance	640	1,000	360	Semivariable	.015		100	720	820
Scrap	720	1,200	480	Variable	.02		—	960	960
Repairs	900	1,500	600	Variable	.025		—	1,200	1,200
	$7,260	$8,700	$1,440		$ .06		$5,100	$2,880	$7,980

	Production hours	Per cent activity	Expenses		
			Fixed	Variable	Total
Normal	48,000	100%	$5,100	$2,880	$7,980
	36,000	75%	5,100	2,160	7,260
	60,000	125%	5,100	3,600	8,700
	38,400	80%	5,100	2,304	7,404

EXHIBIT 5

MANUFACTURING DEPARTMENT WEEKLY BUDGET ALLOWANCE

Department ..... Period .....

Activity	75%	80%	85%	90%	95%	100%	105%	110%	115%	120%	125%	130%
Supervision	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Fixture expense												
Machine maintenance	640	676	712	748	784	820	856	892	928	964	1,000	1,036
Clerical												
Set up												
Repairs	900	960	1,020	1,080	1,140	1,200	1,260	1,320	1,380	1,440	1,500	1,560
Scrap	720	768	816	864	912	960	1,008	1,056	1,104	1,152	1,200	1,248
Supplies												
Tool maintenance												
Totals	$7,260	$7,404	$7,548	$7,692	$7,836	$7,980	$8,124	$8,268	$8,412	$8,556	$8,700	$8,844

EXHIBIT 6

over-all fixed expense of $5,100 for the coming budget period. With this information established for 48,000 hours, or 100 per cent activity, it is easy to compute the expense allowances for Department A at any level of production. In using this method, any budgeted activity is expressed as a per cent of normal. For example, in some subsequent budget period the expected activity may be set at 36,000 hours, or 75 per cent of normal. By multiplying the variable expenses at normal by 75 per cent and adding to it the fixed element of expense, the budgeted allowances based on an expected volume of 36,000 are established. The summary at the bottom of Exhibit 5 illustrates this principle.

Budget Reports

Manufacturing department budget reports are issued weekly to all foremen and the plant manager. These reports show weekly budget allowances and actual costs for each type of expense. Accumulations to date are also listed as well as variances of actual from budget. Explanations of these variances are also noted.

To expedite the issuance of the budget reports, work sheets are maintained for each department. Weekly budget allowances are projected on these sheets based on various percentages of activity. These projections are made at the beginning of the budget period and are exactly like Exhibit 6. Once it has been determined how many hours a department has produced during the week, a comparison with normal hours gives an immediate measure of the percentage of activity. By referring to the proper activity column on Exhibit 6, the allowance for each type of expense at that volume is known at a glance. It has been proven over a period of years that the time expended in projecting in advance allowances at all levels of activity has been well worth the effort. It saves valuable time each week and makes it possible to issue budget reports before they become classified as "ancient history."

The system of budgetary control outlined in this paper is not an untested plan but is, except for a few phases resulting from constant efforts to improve, an efficient tool used by the subject company for a period of fifteen years. The flexible budget procedure has been a great success largely because of the standard-hour cost system used. The standard-hour plan has simplified many problems, kept the budgets streamlined and has been a great aid in the compilation of statistical data so necessary to proper budgeting.

COSTS FOR MANAGEMENT DECISIONS

by EVERETT M. HICKS, Assistant Controller,
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THE COST accountant's only excuse for existence in the corporate picture is found in the uses to which his cost figures are put. It is therefore most appropriate that we review from time to time how well the cost figures which we produce fill the needs of those whose decisions are influenced by the figures which we present. This is particularly true of problems involving special costs for current decisions. These involve:

1. Temporary departure from long-range pricing policies.
2. Addition of new lines or discontinuance of old products.
3. Choice between alternative methods of manufacture.
4. Purchase of parts or their manufacture in the company's own plant.
5. Acquisition of special production tools, such as dies, jigs, or fixtures.
6. Retention or replacement of present equipment.

Short Term Pricing Decisions

Under the heading of costs for special purposes, probably the most common and important use of costs is for the purpose of deciding whether to depart temporarily from long-range selling prices in order to obtain additional business which will utilize excess capacity and provide additional employment in periods of generally poor business, or when seasonal fluctuations would otherwise depress manufacturing activity and employment. The objective of a sound pricing policy is to produce at any given time that combination of sales revenue, costs, and volume which will result in the largest possible total profit and will provide regular employment for as many people as possible.

The general level of desired prices is based on standard or normal costs at a normal volume level. These are the long-run prices which management hopes to realize over a long period of time. Departures from such prices should not be made without due consideration of their effect on the current level of prices, possible competitive retaliation in the form of still lower prices, and the difficulty of restoring prices to their proper level in the

future. Many well-established companies follow the policy of maintaining their selling prices unchanged through periods of high and low volume, changing the level of prices only when important changes occur in the cost of such factors as raw materials and labor rates.

Foreign Sales

However, even in such situations problems frequently arise which call for specially prepared costs. An example of such a problem might be an opportunity to sell in a foreign market in which competitive conditions require sales at prices lower than full standard costs to make and sell. If this full cost as regularly calculated exceeds the selling price obtainable, it does not necessarily follow that the business should be refused. Such business, if it returns more revenue than the actual out-of-pocket costs which must be incurred as the result of its acceptance, may make an important contribution to the total aggregate profit of the business, or it may help to minimize losses which would otherwise be incurred.

The cost figures which are used in deciding a problem of this nature will vary, depending on the actual conditions which exist at the time the decision is made and which are expected to obtain over the future period whose operations will be affected by the decision. For example, if the entire capacity of the plant can be sold at regular prices, obviously the additional low-price business should be refused. On the other hand, if there is a large amount of unused capacity for which no more attractive business is in prospect, the final profit results will be improved as long as the revenue exceeds the out-of-pocket or variable costs. In determining such out-of-pocket costs, consideration must be given to late shift and overtime premiums which would result from the additional business and which might otherwise be avoided if the business were refused.

Such marginal business should be reconsidered regularly in view of changing conditions. If excess capacity no longer exists or if new products can be developed to replace at regular prices the low-profit business, it should be discontinued without regret. If a plan for expansion of manufacturing facilities is under consideration, all existing products should be reviewed to determine whether it might be more desirable to drop some of the less profitable items and provide the needed capacity from existing plant

facilities, thus avoiding the increased investment and the consequently larger annual fixed charges. It should be repeated that special costs for use in deciding problems of this nature will vary, depending on the conditions which exist at the time the decision is made and which are expected to obtain over the future period whose operations will be affected by the decision.

Seasonal Fluctuations

A similar situation is found in the case of a company manufacturing a product, the demand for which is highly seasonal. A good example is the case of a manufacturer of blankets for which the wholesale demand is concentrated in the summer and fall months of the year. Of course, a certain amount of stabilization can be obtained by manufacturing for stock during the late winter and spring in anticipation of later demand, but this entails not only warehousing costs but danger of obsolescence due to changes in style and possible losses due to changes in market prices for raw materials and finished blankets. If customers can be found who are willing to place firm orders for delivery during the winter and spring in consideration of somewhat lower prices, such business may be financially very attractive. In calculating the variable or out-of-pocket costs for such business, not only should the fixed elements of cost be excluded, but consideration should be given to savings which result from regularity of employment. Some of these savings, such as better employee morale, are intangible but nonetheless real, while others such as the effect of labor turnover on merit rating for unemployment insurance, reduction in the cost of training new employees, and elimination of severance pay may be cost factors of real importance.

Incentive Pricing

Another example of special adaptations of costs for pricing purposes is found in their use by public utilities, and to a lesser extent by manufacturing companies for the purposes of incentive pricing. In the case of a company producing and distributing electricity or gas, only a fraction of the total cost is in the generation of the electric energy or gas. Much of the cost is in installing the system necessary to transport the product to the point of use and most of this cost varies very little with volume of consumption. Almost universally these companies use incentive or step

rates which are designed to encourage the increased use of their products. In the case of gas, for instance, the rate for the first quantity necessary for the cooking load is relatively high. The next step is lower and provides for the customer who uses gas for heating hot water, while the final rate is very low for those who use gas for home heating. This is an excellent example of the use of variable costs in designing a rate or pricing system which recognizes both cost and available competitive substitutes in trying to arrive at the optimum combination of volume, revenue, and costs to yield the largest aggregate profit. Studies of order handling, selling, distribution, and manufacturing costs in various quantities would undoubtedly reveal information in many cases which would lead to the establishment of prices based on the quantities purchased by the various customers.

Adding or Discontinuing Products

Another group of related problems for which costs are used in reaching decisions requires the same approach—costs which take into consideration conditions as they exist in the particular situation and at the particular time. Typical of such problems is the case of deciding whether to add a new product or to drop an existing line. If sufficient capacity exists and no more desirable alternative products can be found, the costs to be used in deciding whether to continue an existing line should be variable or out-of-pocket costs only. Nothing is gained by dropping a line which returns something in addition to the variable costs unless some more satisfactory product can be found to occupy the facilities left vacant by the product discontinued. As far as possible selling effort should be devoted to increasing the sale of more profitable items and to the extent that such efforts are successful, the less profitable item may be replaced. Likewise, such items should be considered and studied constantly to see if costs can be reduced by redesign or improved methods.

In the case of the proposed addition of a new line, the existence or absence of adequate facilities should be recognized. To the extent that new plant and equipment will be needed for the production of the new product, the estimated costs for the new product should include a provision for amortizing the cost of these new facilities.

Manufacturing vs. Purchasing Outside

Exactly the same situation exists when making up cost figures to decide whether to manufacture a certain part or to purchase it from an outside supplier. If there are on hand facilities with sufficient available capacity to produce the required quantities of the desired part, there is no need to include space charges, depreciation on the existing equipment or other fixed costs in arriving at the cost of the part to compare with the price from the outside supplier. In many cases this treatment may not agree with the actual costing of the part on the books for the purposes of inventory value and cost of sales determination, but this need not be disturbing because the two problems are not necessarily related. In reaching current decisions the costs must recognize the facts as they actually exist regardless of how the bookkeeping is done.

It should also be kept in mind that the one certain thing about existing conditions is that they will change. Decisions which can be justified only by using out-of-pocket costs should be reviewed periodically to see if changed conditions warrant a change in the decision previously made. An illustration of such a change would be a growth in the requirements for the part which we had decided to manufacture rather than purchase, to the point where all available capacity is utilized and a further supply is needed. This presents a new set of conditions and a new cost study is needed to decide whether the new facilities should be acquired or the additional supply should be purchased.

Selection of Manufacturing Method

The same considerations are involved when a choice of manufacturing methods is to be made based on the comparative costs of the alternative methods. If the quality of the product is equal by either method, the cost for each method should be prepared based on the actual out-of-pocket costs required in each case. Sometimes it is necessary to go further than the variable cost rate for the cost center to determine the actual cost of certain items as they affect the particular operation. To illustrate this point, let us assume that a certain material can be cut or sliced using an ordinary grinding wheel, but the same material can be cut faster on the same machine by using a diamond wheel which is much more costly. In such a comparison the variable cost rate

for that type of operation should be used, eliminating the amount included for abrasives. This will give the comparative variable cost by the two methods exclusive of the cost of the grinding wheels which can be calculated by dividing the cost of the wheels by the number of pieces cut per wheel. By adding the wheel cost in each case to the other variable costs, we obtain the comparative costs on which to base the decision as to which method is more economical. Such refinements will sometimes alter the conclusions if properly recognized, and a good cost accountant must be prepared to modify his usual methods when conditions indicate that such a modification will have a significant effect on the result.

Acquiring Production Tools

The decision as to the desirability of acquiring certain production tools such as dies, jigs, or fixtures is frequently based on savings to be obtained from the use of the tool. Of course in all decisions of the type under consideration, there are usually other factors which influence the conclusions. In the case of tools, certain operations cannot be performed satisfactorily without the use of a special tool, while other tools may be required to insure necessary accuracy and interchangeability of parts in assembly operations. Such considerations are frequently controlling, but the effect on cost is a common basis for decision in acquiring special tools for the manufacture of certain parts. The following procedure is suggested as a good working basis for reaching a decision as to the acquisition of tools where cost saving is to be used as justification for the investment.

First, it is necessary to have an estimate of the future production of the part. Since the tool will be designed solely to reduce costs on the particular part in question, there is danger of obsolescence due to periodic redesign of the machine or to engineering changes which may affect the part.

The cost of the part is then calculated under the present method without the tool and under the new method using the proposed new tool, and the saving per piece is multiplied by the expected annual pieces to be produced to give the annual saving to be derived from the acquisition of the tool. The costs per piece under both methods are calculated using the variable cost rates only for the operations.

The cost of the new tool is then estimated and compared with the expected annual savings for the purpose of deciding whether

the acquisition of the tool is likely to be a good investment. If the tool is to be purchased, of course the cost is determined by the supplier's quotation. If we propose to make the tool in our own toolmaking or manufacturing departments, we use the variable cost rates only in estimating the cost of the tool for comparison with the savings which were similarly calculated, thus assuring comparability of both calculations.

If there is no known reason for expecting early obsolescence of the part, the decision is made to acquire the tool if the annual savings will repay the investment in a period of four years. This period must be modified if redesign is expected within a shorter time.

Accounting for Special Tools

At this point I should like to digress for a moment to point out what seems to be a common fallacy in accounting for special tools. Many manufacturing companies follow the policy of expensing the cost of special tools directly to the cost centers where they are used. Even those companies which recognize the extended life of such tools by capitalizing them usually charge the depreciation to the respective cost centers. As a result of this practice the overhead rates of the manufacturing departments are increased by the cost of tools, and the products passing through these departments take a charge for special tools whether or not any such tools are used in a particular case. Even worse, in many cases, is the result of costing when the hours required for performing a certain operation are drastically reduced by the introduction of a new production tool.

In the cost calculated without the use of the tool, the operation may have required ten hours, and, if the special tools amount to five cents per hour in the overhead rate, the cost of this operation included fifty cents for special tools although no such tools were used. Now a new and expensive jig reduces the operation time to one hour, and if the same cost method is used, the operation is charged with only five cents for special tools. The point is that if special tools are included in manufacturing overhead, those operations performed without the tools bear a heavy charge, while other operations for which tools have been provided are charged too little. Of course the seriousness of this error depends on the degree to which special tooling is used and the resulting importance of tooling costs in the overhead rates. In any case

the cost of special tools should be excluded from the overhead rates used in determining cost savings on which decisions on acquisition of new tools are based.

The most accurate way to amortize the cost of special tools would be to charge for their use as parts are manufactured which require the use of the special tools. The clerical detail necessary to keep track of the use of such tools individually is usually prohibitive. As an alternative it is suggested that the total tooling cost be estimated when a new design is originated and that this total be divided by the estimated units of this design which will be sold to determine the estimated tooling cost per unit sold. All special tools should then be capitalized as acquired, and the reserve for depreciation should be credited, with a corresponding charge to cost of sales, as sales are made. The estimates of total tooling cost of the lines of product and the estimated total sales should be reviewed annually and revised as indicated by actual tool expenditures and changes in forecasted sales.

The departmental overhead rates under this method contain no costs of special tools, and the inaccuracies described above are avoided. The charges for special tools are made to cost of sales in accordance with the sales of the product for which they were acquired, providing higher charges in times of high activity and correspondingly lower charges when sales are lower. The estimates used as the basis of the charges may prove to be inaccurate, but frequent revision corrects for such errors in forecasting. These estimates provide a much more satisfactory means of absorbing the costs of special tools than expensing them immediately or capitalizing them and amortizing them on a straight time basis. The cost of the product is calculated in the usual manner and to the total cost is added the cost of special tooling per unit of product for that product line.

Replacement of Equipment

One of the most difficult cost problems is the justification of replacement of existing facilities. The whole subject of replacement policy is one which has been given insufficient consideration by most companies. Indeed, the replacement policy of American industry has a wider significance, because the rate of progress, the improvement of our standard of living, and the continued vitality of our economic system are all dependent on the rate at which we adopt new methods resulting in increased productivity.

Not only does our replacement policy affect our ability to compete in international markets, but our status as a world power is largely dependent on our ability to produce more and better goods than any other country in the world. The great flow of munitions, airplanes, tanks, and countless other needed products during the recent war demonstrated once more the capacity of our American system.

Yet very few companies have a replacement policy worthy of the name. In most cases suggestions for replacement do not result from a careful study of existing equipment compared with available alternatives to determine whether the company can afford to keep present machinery. Rather, the replacements are more often made on a case by case basis with the initial suggestion being made by the foreman or his immediate superior. Most purchases of new equipment are made either for expansion, to provide for changes in the character of the work, or because the present machines have lost their accuracy, or for various other reasons are no longer adequate to do the required work.

Length of Pay-Off Period

To make matters worse, when a replacement based on cost savings is proposed, many companies require an unreasonably short pay-off period with the result that the purchase is deferred longer than can be economically justified. Many companies which consider themselves lucky to make an average return of ten per cent on net worth insist that cost savings must return the investment in a period as short as two years, although these same companies will depreciate new equipment over a period of ten or fifteen years. If the character of the proposed investment is such that the service life is expected to be only two years, then it is obviously necessary to insist on a very short pay-off period because in every case the pay-off period must be enough shorter than the expected life of the asset to be acquired to permit the earning of a proper return on the investment.

For example, if a ten per cent return on the investment is considered proper by the management of the company, a machine with an expected service life of ten years must produce enough savings to pay for itself in about 6⅔ years to yield a return of ten per cent. The use of a shorter pay-off period in such cases may result in deferring the replacement until long after it can be economically justified. In appraising the expected service life

of a new asset the risks must be carefully evaluated. If the industry is in a state of rapid change in design of product or in methods of manufacture, then a short service life should be used for machines or equipment which are likely to be affected by such changes. On the other hand, if methods of manufacture are fairly well stabilized and the proposed machine is easily converted to produce any contemplated changes in product, a much longer service life can be justified. The point is that the required pay-off period is definitely a function of the expected service life of the asset, and this service life must be established in the particular case in the light of conditions which exist at the time of purchase. In reaching a decision the risks which are involved on the particular type of equipment under consideration must be evaluated before deciding what pay-off period will be required.

Replacement policy is such a vital factor in our economy and in the economic health of each individual enterprise that it is certainly worth while for each of us to review the policy of his company to see if it has been carefully thought out and whether it contains any arbitrary standards such as the short pay-off or a standard pay-off period regardless of the type of equipment under consideration. In fact, in some cases we will probably find that there is no policy at all.

Nature of Replacement

As accountants we tend to think of replacement as the purchase of new assets to replace those which have been worn out. This is an oversimplified concept of replacement as it actually occurs in our modern dynamic industrial life. In his book entitled "The Bogey of Economic Maturity," George Terborgh calls attention to the fact that most assets are displaced rather than replaced in the following words:

> "The erosion of serviceability may reflect a great variety of factors, which can be summed up under three heads: (1) loss of ability to perform the function for which the unit was originally created; (2) loss of demand for the performance of this function; (3) improved ability on the part of new units to render the same or a competitive function. These influences operate, in varying combinations and proportions, throughout the life of all durable goods, reducing their capital value eventually to the vanishing point.

> "Capital formation is not a polite game in which replacements meekly and decorously await, like dutiful heirs, the natural death of existing assets. It is a ruthless and cut-throat struggle in which new capital goods rob the function of the old. It is murder by degrees. We may add, parenthetically, that this displacement of function is frequently due to the competition of new goods quite different in character from the old. The function of the horse and buggy was appropriated by the automobile, which dispossessed likewise the electric interurban railway. The airplane displaces the ocean liner. Facilities for manufacturing nylon supersede the silkworm. Not only do the new capital goods differ from those displaced; it is obvious that they often have different owners. An investment by one company, for instance, may in effect replace the facilities of a competitor by reducing or eliminating their function."

Most replacement is gradual, resulting from the constant introduction of better machines which usurp the functions of the old, causing the obsolescent machines to be put aside wholly or partially as standby capacity. For this reason many acquisitions of capital goods occur during periods of high business activity when the standby facilities prove to be inadequate for the full-time service demanded of them. In such cases of gradual displacement the savings are difficult to calculate and the exact time when the facilities should have been replaced is not easy to determine.

Pure Replacement

However, let us consider the simple case of pure replacement where the asset has not been gradually displaced, but is being considered for discard in favor of a new machine which will show savings in manufacture. The factors which should be considered in determining the pay-off period to be required have been discussed above. What costs should be considered in estimating the anticipated saving to be realized from the new machine?

The general principle is clear that the effect on the out-of-pocket or differential costs which will be incurred in the future under each of the two alternatives is all that needs to be considered. First, let us discuss the question of whether the current depreciation charges for the old machine or the amount of remaining undepreciated balance has any bearing on the problem. The capital expenditure for the old machine has already been made and the current deprecia-

tion charge is merely the amount of the original cost which we are allocating to the current period. If the old machine is obsolete now, its cost should have been written off over its service life, and any unamortized balance in excess of the sale or salvage value remaining when it becomes obsolete represents an error in the original service life used for depreciation purposes. This error will be offset by other cases where actual life of the asset exceeds the original estimate and the asset continues in use after it has been fully depreciated.

In the calculation of the differential costs under the two alternatives we should recognize only those costs which make a difference in our conclusions. Since no further cash outlay is involved in the future for the acquisition of the old machine, in calculating costs for replacement decisions current depreciation charges should be excluded from the cost if we retain the old machine and the presence or absence of an unamortized balance on the books for this asset should in no way affect the decision as to its replacement.

Possible Savings

Savings in usage of materials and in direct labor are fairly easy to determine in most cases by comparing the cost using the new machine with the present cost of these items. One word of caution should be injected as to the volume of production to be used in this calculation. If the new machine has as increased capacity over the old, care should be taken to use only that volume of production which can be made and sold in arriving at future savings. The full capacity of the faster machine should not be recognized unless there is a reasonable expectation of demand for the additional volume.

For the other overhead costs such as supervision and other indirect labor, supplies, and repairs, the variable cost rates derived from the flexible budgets can be used as a starting point. However, the effect of the replacement on items of expense such as repairs and spoilage must be considered separately.

A record of the repair costs of each machine tool is very valuable in deciding on replacements. The record of repair charges for the old machine should be reviewed to see if these costs are excessive and also whether the trend is toward higher and higher charges as the machine becomes older. Old machines must be torn down and rebuilt from time to time if they are required to produce accurate work, and replacement should be considered before any

major repair job is undertaken. At the close of the war much deferred maintenance work of a major nature was needed to restore equipment to proper operating condition.

We were faced with requests for special budget allowances to cover this cost in many of our operating departments. We agreed to these special allowances for major repairs provided the request was submitted before the work was begun. In this way the equipment engineer was notified in advance of the need for major repair expenditures and he considered the desirability of replacement before authorizing the repair work which might be avoided if a decision to replace were made.

The question of spoilage also requires investigation in deciding whether to retain or replace. A new machine is usually more accurate and causes less spoilage than one which is worn and less accurate.

Conclusion

The principle to be followed in preparing costs for replacement purposes is the same as that stated in the other cases of costs to be used for management decisions between alternative courses of action. Those items of cost which should be included vary with the actual conditions which exist at the time the decision is made and which are expected to obtain over the future period whose operations will be affected by the decision. We must remember that the costs which we prepare are dependent on the uses to which those costs are to be put. We must learn to adopt an operating point of view, retain our perspective, and not become lost in a maze of our own construction resulting from our handling of problems of determining standard costs, allocating overheads, disposing of variances, and the countless other accounting problems which we must handle. If we are to be of real service to management in reaching decisions between alternative courses of action, we must remember to think differentially and to prepare and interpret our cost figures from an operating point of view.

A SIMPLE INCENTIVE METHOD THAT PAYS

by A. O. HARDING, Secretary,
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SOME months ago the labor committee presented the workers' demands for an increased hourly wage rate. The union had been granted several increases in hourly wage rate which had made a total increase of about 35 per cent since 1942, at the time of the labor freeze. Since the end of the war and our reconversion to peacetime production, we had operated on a strictly hourly basis and had no premium or incentive method. The production efficiency had dropped very materially from that of prewar times.

The committee was informed that an hourly rate increase was out of the question at that time and its members were shown the facts concerning labor inefficiency. Some of the members of the committee frankly acknowledged that they had not been putting forth their best efforts and were wasting time at rest periods and before quitting time. Our contract calls for a ten-minute rest period in the morning, and allows five minutes in the evening for washing up. With all the policing we could do this rest period was stretched into twenty minutes and the evening washing-up period from ten to twenty minutes.

We had several employees who had worked under incentive plans, and when we presented our plan they were very enthusiastic about it and became our best salesmen in selling the plan to the other workers. Being largely classed as a job plant, we took the monthly sales as a basis for determining the amount of labor allowance. In a plant where production is straight line and produces for finished stock, the value of the production could be used rather than the monthly sales dollar.

Basic Labor Allowance

From previous experience since the war, the percentage of labor to the sales dollar was determined. Inasmuch as this is exceptionally high for our product, the employees were given one-half of the savings to be distributed among all workers eligible to union membership. The percentage of direct and indirect labor per dollar of net sales is used as the base figure to determine all future increases or decreases. The total net sales for the month are multi-

plied by the base figure. If the result is larger than the total of direct and indirect labor cost, one-half the difference is paid to the employees. The payment is to be made not later than the 15th of each month.

Distribution of Savings

The savings are divided by the total number of all hours worked. These savings per hour times the number of hours worked by each employee represent the amount to be paid to that employee.

Payment is made by separate checks on or before the fifteenth of each month for the savings made the previous month to each employee who worked ninety per cent of the work days and who is on the payroll on the last day of the month. The provision as to the ninety per cent does not apply to employees on leave of absence.

Adjustments of Base

The base figure is subject to revision upward or downward as changed conditions may justify. Should the net sales price per unit of the company's product be reduced this base percentage is to be increased. Should the net sales price be increased as shown by price schedules this is to be decreased. Adjustments upward are to be made, for example, when new work processes are brought into the plant, such as manufacturing parts now being manufactured for us by others. Adjustments of the base percentage downward are made when the company is able to reduce labor per unit by elimination of processes. Should the union not agree on any adjusted base figure, the determination is left to arbitration as set forth in the labor contract.

Vacation pay, inventory work, and the like are not to be considered as a part of direct or indirect labor. All overtime work shall be considered as straight time in the determination of the per hour saving. The premium for overtime as set out in the Federal regulations is paid by the company and the bonus figure is not penalized by this amount.

Results of Plan

It has been our experience that the plan is doing more through employee policing than could be done by any reasonable number of supervisors or policemen. The ninety per cent clause has also helped in the elimination of absenteeism. The plan has already brought our labor costs within reason, due to the increased effi-

ciency in the plant, not through faster operating, but by a little closer application to the tasks. We have experienced no difficulties in making changes in the base percentage, having used actual performance and figures in presenting the differential.

The following is an illustration of how the plan works:

Monthly sales	$100,000
20 per cent base equals labor allowance	20,000
100 employees @ 160 hours each, 16,000 hours, payroll	14,400
Savings from base figure	$ 5,600
Half distributed among employees	$ 2,800

$2,800 ÷ 16,000 hours = $.17½ per hour.

The number of hours that each employee has worked is multiplied by $.17½ to determine his share or proportion of the savings. Should some employee become ineligible, the hours worked are reduced by the amount of said employee's time and a new hourly bonus rate is determined, all of the amount being distributed to eligible employees.

The plan is so simple that its operation requires a minimum of clerical help. It is working for us and will work with any industrial plant on friendly relations with its labor committees, but no plan will work where management and labor are each suspicious of the other.